ABSTRACT

This is the first study conducted in California among vulnerable individuals with coronary artery disease on the acute cardiovascular health effects of exposures near subject residences to size-fractionated particles and to particle characteristics linked to mobile sources. We conducted a comprehensive particulate matter (PM) monitoring effort for a repeated-measures panel study aimed at evaluating acute cardiovascular health effects of exposure to PM. We followed 64 nonsmoking elderly individuals with coronary artery disease living in retirement communities in the Los Angeles Air Basin of California. Subjects were followed with 12 weekly blood draws for biomarkers and over 10 days with ambulatory electrocardiographs and blood pressure monitors. This project supplements the exposure assessment for an NIH-funded study. We found the contribution of mobile sources to indoor PM levels was similar to their corresponding outdoor estimates. Analysis of the relation between PM redox activity and blood biomarkers was largely nonsignificant. However, analysis of health outcomes and direct air measurements revealed that primary combustion markers [elemental-black carbon (EC-BC), primary organic carbon, CO, NO_x-NO_2] were positively associated with blood pressure, electrocardiographic ST segment depression (an indicator of cardiac ischemia), biomarkers of systemic inflammation, and platelet activation, and were inversely associated with erythrocyte antioxidant enzymes. Particle number (PN) and particles<0.25 μm were more strongly associated with biomarkers than particles 0.25-2.5 μm. Biomarker associations were stronger for indoor exposures to EC and PN of outdoor origin than uncharacterized indoor exposures. Overall results suggest that current regulations of particle mass may not completely represent particle size fractions and components important to protect public health of vulnerable populations. This likely includes particles <0.25 μm and pollutant components linked to fresh traffic emissions, including indoor infiltrated particles from mobile sources.